

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/4/2010 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-3 and 7-14 have been considered but are unpersuasive. The amendment to claims 1, 7, 13, and 14 recited a metal walled processing vessel with a front side and a rear side; a gas injection nozzle unit is configured to inject gas into the metal-walled processing vessel so that the gas flow through the processing space in a gas-flow direction from the front side to the rear side and recite the location of the gas injection nozzle. Applicant inquires about the location of the remote plasma part and the supply line on page 10. See antenna elements 125 and power supply line 140 see also columns 4-6 that discuss the plasma generation in Shamouilian et al.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1-3 and 7-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase et al (US 6,399,922) in view of Aoyama et al (US 5,651,827) and Shamouilian et al (US 6,440,922).

Regarding claim 1: Okase et al teaches a processing vessel 24 made of Al see col. 5 lines 37-39 having a gas injection nozzle unit (showerhead 72 with nozzles 80) connected to the side of the vessel, an UV light source 92, an opaque case (liner) see discussion of transmitting window not that the window cover an inner wall that is mounted in aperture 82 see col. 7 lines 49-56, a supply of radicals via gas source 71) a heater portion 44, a holding member (worktable 36). See figures such as Fig. 2, 7, and 14 wherein the top of the chamber is comprises the front side and the bottom of the chamber comprises the rear side. Note at least some of the nozzles are located in the recited location. Okase et al fails to a rotational drive mechanism and a remote plasma part

Aoyama teaches a rotational drive means see Fig. 6.

The motivation to provide a rotational drive means in the apparatus of Okase et al is that rotating the substrate during process is conventional and known to improve processing time and process result uniformity. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide rotational mechanism is the apparatus of Okase et al in order to rotate the wafer as taught by Aoyama et al.

The modification of Okase et al and Aoyama et al fails to teach the remote plasma part.

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The prior art of Shamouilian et al teaches a PECVD chamber with a gas supply provided at all four walls, namely the top, bottom, left, and right sides. Col. 3 lines 54 suggests that quartz could be used a material of construction of the chamber. According to col. 4 line 35-col. 5 line 60 a RF power source, electrode, and an antenna 125 act as plasma generators. The prior art of Shamouilian et al reveals that it conventional to provide such generators to create a plasma of the process gas. Col. 7 lines 1-11 reveals that radiant lamps are used to provide greater temperature uniformity and faster and more responsive control over temperature fluctuations inside the chamber 25. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a remote plasma part as taught by Shamouilian et al in the apparatus of Okase et al as modified by Aoyama as an alternative mode/design of processing.

Regarding claims 2 and 3: See Figures of Okase et al.

Regarding claim 7: Okase et al fails to teach a UV protecting glass window blocking UV on the side of the processing vessel.

Aoyama et al further teaches UV glass blocking windows that are part of the opaque liner, see Figs. 7 (element 20), Fig. 8 (element 18), Fig. 11(lb), Fig. 12 (opaque portions), Figs. 14 and 16 (element 8).

The motivation to provide a UV protecting glass in the location suggested by Aoyama et al is that this allows for more controlled path of UV treatment. Such control will optimize the product result and only allow treatment in the portion of the chamber as desired. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a

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UV protecting glass in the location suggested by Aoyama et al is that this allows for more controlled path of UV treatment

Regarding claims 8-10: Okase et al fails to teach multiple part windows. See Aoyama wherein the first and second windows are the transparent and opaque portions illustrated in each Figure listed above, see also col. 3 lines 38-65.

Regarding claims 11 and 12: The susceptor and pins (arm portions) of Aoyama are made of transparent quartz according to col. 8 lines 50-64.

The motivation to modify the apparatus of Okase et al with the multiple part window and susceptor/pins made of quartz is that the multiple part window is an obvious matter of design choice to construct the window of one-piece or to construct it of multiple pieces. Likewise, the motivation to construct the susceptor and pins of transparent quartz is that the material allows for more efficient temperature control of the wafer by using the heat from the UV lamps in addition to the heater in the support. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Okase et al with the teachings of Aoyama et al.

Regarding claim 14: See the Figures of Okase et al for the evacuation openings. Recall the prior art of Shamouilian et al provides teachings of the remote plasma part.

See Figures of Shamouilian et al, evacuation opening is interpreted as exhaust system 80 which further includes 90 and 85.

The motivation to provide the evacuation opening of Shamouilian et al is that these system and configuration is known to successfully exhaust spent gas and control the pressure of the process

gas in the chamber. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the evacuation opening of Shamouilian et al in the apparatus of Aoyama et al.

Regarding claims 15 and 16: In Aoyama et al the opaque and transparent cases coexist on the wall of the chamber they both are depressurized at the same time.

Regarding claim 17: The apparatus of Okase et al as modified by Aoyama et al fails to teach a SiC heater plate.

The prior art of Shamouilian et al mentions in col. 4 lines 14-34 that SiC is among the known materials of construction of dielectric member 100 see Figure 1. The motivation to provide plate of SiC is that this material is a known dielectric material having the chemical and physical properties that can withstand the claimed process. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the apparatus of Okase et al as modified by Aoyama et al as modified by Shamouilian et al to use SiC.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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April 25, 2010

/Sylvia R MacArthur/
Primary Examiner, Art Unit 1716